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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/731,226	12/04/2000	Rajeev Joshi	18865-005100US	8732

7590

07/17/2003

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EXAMINER

VU, HUNG K

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 07/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/731,226

Applicant(s)

JOSHI, RAJEEV

Examiner

Hung K. Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Request for Continued Examination

1 A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 04/24/03 has been entered. An action on the RCE follows.

Claim Objections

2. Claims 7 and 9 are objected to because of the following informalities: In claims 7 and 9, line 1, "bumps" should be changed to "bump" for clarity. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barr et al. (US 2002/0000665) in view of Wang et al. (PN 6,362,087, of record).

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Barr et al. discloses, as shown in Figure 12, a wafer for use in making a chip device, the wafer comprising:

- a non-passivated die;
- a refractory metal layer (126) at non-isolation locations on the die [Col. 1, section 10];
- a first copper layer (128) directly on the refractory metal layer [Col. 1, section 10];
- a titanium passivation layer (82) directly on the first copper layer at non-solder bump locations [Col. 2, section 13 and Col. 3, section 22];
- under bump material (1220) directly on the first copper layer at solder bump location.

Barr et al. does not disclose the refractory metal layer comprising titanium layer. However, it is recognized in the art that the refractory metal layer is a generic term used for titanium layer.

Therefore, the phrase “refractory metal” would meet the recited term of “titanium”. Or in alternate, Wang et al. discloses a refractory metal barrier layer (16) comprising titanium layer.

Note Col. 6, lines 47-51 of Wang et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the refractory metal layer of Barr et al. comprising titanium, such as taught by Wang et al. since refractory metal and titanium are both considered to an art recognized functional equivalent as the barrier layer for the semiconductor device.

With regard to claims 7 and 9, Barr et al. and /or Wang et al. disclose the wafer further comprising solder bump on the under bump material.

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4. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (PN 6,362,087, of record) in view of Agarwala (PN 5,376,584).

Wang et al. discloses, as shown in Figure 5, a wafer for use in making a chip device, the wafer comprising:

- a non-passivated die;
- a first titanium layer (16) at non-isolation locations on the die [Col. 6, lines 51-54];
- a first copper layer (20) directly on the refractory metal layer [Col. 8, lines 12-14];
- a titanium passivation layer (26a) directly on the first copper layer [Col. 10, lines 39-47];
- under bump material (30) directly on the first copper layer at solder bump location.

Wang et al. does not disclose the titanium passivation layer at non-solder bump locations.

However, Agarwala discloses the titanium passivation layer at non-solder bump locations. Note Figure 6 of Agarwala. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the titanium passivation layer of Wang et al. at non-solder bump locations, such as taught by Agarwala in order to reduce the edge stress at the ball limiting metallurgy pad structure.

With regard to claims 7 and 9, Wang et al. and Agarwala disclose the wafer further comprising solder bump on the under bump material.

Response to Arguments

5. Applicant's arguments with respect to claims 6-9 have been considered but are moot in view of the new ground(s) of rejection.

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Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-4:30, alternate Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

July 8, 2003

Hung K. Vu